rp5400, rp5430, rp5450 and rp5470 Troubleshooting and Build-Up Procedures Product Update

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1 rp5400, rp5430, rp5450 and rp5470 Troubleshooting and Build-Up Procedures

Introduction

This document is intended to assist in the troubleshooting of an rp54xx series system exhibiting one or more of the following repetitive symptoms:

- The system will not power on or remain powered on. In the power-on mode, the green power LED on the system front panel should be on and the cooling fans are all receiving DC power and are spinning at normal speeds.
- The system will not power on to standby mode (power switch off). In the standby mode the green power LED on the system front panel and on the platform monitor board will be flashing.
- The system will not begin self-test execution. In this case, the system will successfully power on and remain powered but the system will fail to enter its self-test execution.
- Tbe system will power on and enter the power-on self-test execution but will not pass self-test and/or boot to the boot console handler (BCH).

Initial Troubleshooting Steps

Prior to starting troubleshooting, please note:

- Service Note A5191A-05 documents a DC power-on issue that may provide assistance. It provides DC power troubleshooting procedures and illustrations. The troublesbooting procedures in this Service Note will be utilized in this document.
- Service Note A5191A-28 documents a problem with the DC power converter cable that may cause a self-test hang that may not be resolved by the troubleshooting procedures in this document.
- The guardian service processor (GSP) should be functional and available whenever the system successfully powers up to standby mode. In standby mode DC power provides "housekeeping" voltages to the GSP. It is highly recommended that the GSP be utilized to assist in troubleshooting whenever available.

Begin Troubleshooting

It can be difficult to troubleshoot an rp54xx series system that will not power on, initiate self-test, or boot to BCH. In some cases the GSP will provide meaningful events in the error logs. These error log entries may point to a failure in a critical component (e.g. multiple fan failures, a bad power supply, etc.) causing the

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problem. Therefore fully analyze the GSP error log contents associated with the power-off condition. Occasionally the error logs do not have any relevant entries or may not point to any specific condition—for instance only specifying a high voltage DC undervoltage condition. In this case go to the problem statement in this document that best describes the symptom and follow the troubleshooting steps in order.

System Will Not Power On to Standby Mode

If the system will not power on to standby mode, follow these troubleshooting steps. These troubleshooting hints are for standby mode (power switch OFF).

1. Check voltage: +48vdc and +15vdc.

   - **+48vdc.** The power supplies are creating +48vdc output if the power supply LED on the power supply module(s) is solid green. The +48vdc is measured at pins 2, 4 and 5 (Figure 1-1 on page 5) of power converter output J39.

NOTE Measuring voltages at J39 while it is connected to the system board requires a voltmeter probe with a sharp tip about one inch long to contact the crimp terminals.

   - **+15vdc (housekeeping voltage).** The housekeeping voltage is present when the power LED on the front panel is blinking green. The housekeeping voltage is present when the power LED on the platform monitor is blinking green. The +15vdc is measured at pin 1 (Figure 1-1 on page 5) of power converter output J39 and at the V15 testpoint on the platform monitor.

2. Reduce the system to the minimum power configuration for standby mode (+48vdc and +15vdc voltages): power supply 0, the power converter, and the system board. Replace these field replaceable units (FRUs) individually or all at once until the voltages are present.

System Will Not Power On or Remain Powered On

These are troubleshooting hints for failure to power on.

1. Ensure standby mode voltages are present.

   - Turn the power switch on. In addition to +48vdc and +15vdc standby voltages, the +12vdc, +5.1vdc, and +3.3vdc should be present.
   - **+12vdc.** The +12vdc voltage is present if the embedded disks have power. Examine green power LED on embedded disks. This LED should momentarily illuminate after the power switch has been turned on. The +12vdc is measured at pins 3 and 6 (Figure 1-1 on page 5) of power converter output J39.
   - **+5.1vdc.** This voltage cannot be verified by observing LEDs. The +5.1vdc is measured between bus bar contacts J37 and J38 (Figure 1-1 on page 5) on the system board and at the V5B testpoint on the platform monitor.
   - **+3.3vdc.** This voltage cannot be verified by observing LEDs. The +3.3vdc is measured between bus bar contacts J35 and J36 (Figure 1-1 on page 5) on the system board.

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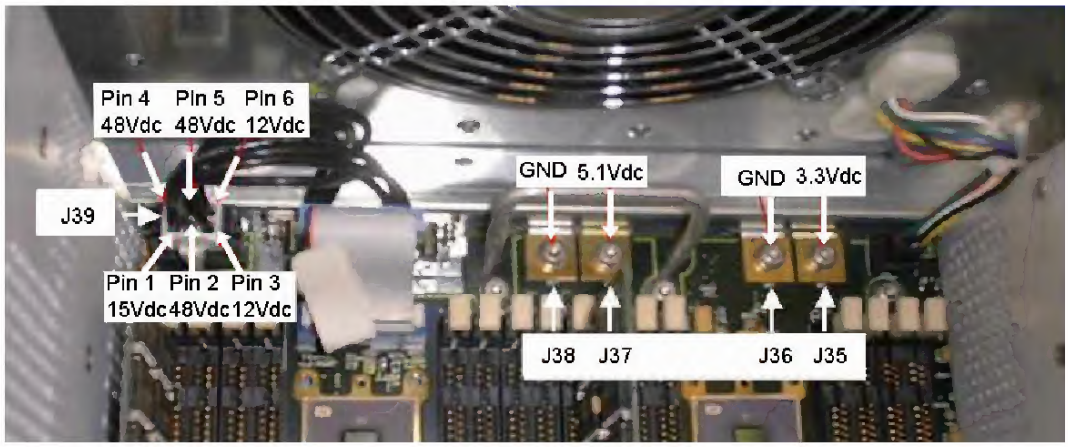
Figure 1-1 Power Supply Test Points



2. Reduce the server to the minimum power-on configuration. The minimum hardware an rp54xx series system requires for power on is:

   - Platform monitor
   - Power converter
   - System board
   - PCI I/O backplane
   - Display board
   - Any single power supply (power supply 0 preferred)
   - Any 7 fans (it is probably not necessary to remove a fan—however if fewer than 7 fans are installed and functional, the system will not remain powered up).

     a. Replace these FRUs individually or all at once to get the system to power up.

     b. Add remaining FRUs until system is complete.

NOTE When adding processors, be sure to install the processor support modules first. If processors are installed but the corresponding processor support module is not installed, the system will not power up. A system alert that describes a faulty processor support module 0 or 1 is generated.

System Will Power On but Will Not Enter Self-Test

In this situation, all the DC voltages needed to operate the system are available but the system appears dead. In this case, there will be very little useful information available from any LEDs or other physical indicators on the system. It will be necessary to utilize the GSP to troubleshoot. Thus, it is imperative that the GSP is functional and that there is access to the GSP commands and output through any of the available interfaces (e.g. GSP LAN, console port, etc.).

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Once access to the GSP is made available, the actual status of the system can be obtained through the GSP's virtual front panel (VFP) command. If problems exist with the runway bus, the system will power on but tbe CPU(s) will not enter self-test. Cbecking the VFP at this point will show the following:

```
GSP> vfp

VFP
```

This command activates the immediate display of tbe virtual front panel.

```
LEDs:   RUN      ATTENTION      FAULT       REMOTE       POWER

        OFF      FLASH          OFF         ON           ON

LED State: No code is executing.  Non-critical error detected.

Check Chassis and Console Logs for error messages.

power                    monitor                    4400
```

Decoding the 4400 chassis code as a platform monitor code translates to:

- Source -> 4 = power
- Caller Activity -> 4 = monitor

Assuming that the reporting entity type is platform monitor, then the caller activity would also be monitor:

- Caller Subactivity -> 00 = unspecified.

This chassis code indicates that the CPU failed to enter self-test due to a system power problem. Since the fans turned on and stayed on, the power supply subsystem is obviously functional. The chassis code does not provide sufficient information for this condition.

Tbe recommendation on troubleshooting an rp54xx series system that fails to enter CPU self-test with a VFP self-test chassis code of 4400 (or simply does not seem to enter self-test) is to concentrate on the runway components. On an rp54xx series system tbe main runway components are the processors (and their associated processor support modules [PSMs]) and the system card. An rp54xx series system must have a minimum of 2 functioning processors installed—in the processor 0 and processor 3 locations—before the runway bus is functional and the processors will begin to execute self-test code.

On a 1-way system, there must be a processor module in position 0 and a runway terminator (P/N A5570-62014) assembly in processor position 3. There must also be a processor support module power supply in PSM0 position. On systems with more than 2 processors installed, it is best to remove all but processors 0 and 3 and retest. If the system board is equipped with a processor power dipswitch (e.g. dipswitch S3 on an rp5430 or rp5470), try disabling processors 1 and 2 by placing switch 2 and 3 on dipswitch S3 to off. Next, try replacing PSM0. Then replace one or both processors (or alternatively replace processor 3 with a runway terminator). A faulty runway terminator may also prevent the system from entering self-test. As a final alternative, replace the system card. In this situation, replacing parts other than those associated with the system runway bus is typically not necessary. The minimum system configuration needed to have an rp54xx series system initiate self-test code is the same as for tbe minimum power on configuration above with the addition of the core GSP board (so that the GSP's VFP command can be executed and monitored), Processor 0, Processor 3/Runway terminator, and PSM0.

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System Will Not Pass Self-test

In cases where the system will power up and initiate CPU self-test but will consistently not pass self-test and/or boot to boot console handler (BCH), the following troubleshooting process may be used to help localize the bad part(s). Self-test initiation or forward progress may be monitored via the GSP's VFP command.

1. Thoroughly analyze any GSP error messages that appear to be associated with the self-test failure(s). Replace any components associated with the GSP errors and retest. After replacing any part, perform another analysis of any GSP error messages. Look for changes in the self-test errors or failure symptoms. It is possible that a replacement part malfunctions or the part is not properly installed. Avoid random replacement of parts as a method of troubleshooting the problem.
2. If Step 1 does not appear to find the problem, try removing all the memory DIMMs and all the PCI I/O cards - including the core SCSI/LAN card. On an operational system with these parts removed, the VFP output will display:

```
memory                    config                    7213

***** EARLY BOOT VFP : SYSTEM ALERT *****

SYSTEM NAME: nbluegsp

DATE: 01/15/2002 TIME: 20:30:17

ALERT LEVEL: 15 = Fatal hardware or configuration problem prevents operation

REASON FOR ALERT

SOURCE: 7 = memory

SOURCE DETAIL: 4 = SIMM or DIMM    SOURCE ID: FF

PROBLEM DETAIL: B = missing

LEDs:   RUN        ATTENTION        FAULT        REMOTE        POWER

        FLASH      OFF              OFF          ON            ON

LED State: Running non-OS code. (i.e. Boot or Diagnostics)

0x000000FB74FF2103 00000000 00000000 - type  0 = Data Field Unused

0x580008FB74FF2103 00006600 0F141E11 - type 11 = Timestamp 01/15/2002 20:30:17

A/a: ack read of this entry - Q/q: quit Virtual Front Panel Display

Anything else redisplay the log entry
```

3. If the above VFP output is not displayed, the self-test did not get to the point of testing memory for some reason. A problem could exist in the system card or perhaps in one or more processor modules. In many cases, failures in executing self-test will result in an high priority machine check (HPMC). In this case, there will be many GSP error log entries logged associated with machine check. Unfortunately, root cause analysis of an HPMC via the GSP error log entries is typically not feasible. The HPMC PIM itself would have to be analyzed and if the system will not boot to BCH this is not possible. When dealing with a 3 or 4-way system, try running the self-test with a minimum CPU complement (e.g. only CPUs 0 and 3 or CPU 0 and a runway terminator in CPU 3's slot position). If the system board is equipped with a processor

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power dipswitch (e.g. dipswitch S3 on an rp5430 or rp5470), try disabling processors 1 and 2 by placing switch 2 and 3 on dipswitch S3 to off. After eliminating the processors as potential faulty part(s), replacement of the system card may be necessary.

4. If the above memory missing alert message is displayed, install at least one pair of memory DIMMs in their proper DIMM slots and retest. If the memory subsystem is OK, a typical VFP output appears as:

```
I/O                    test              8119

***** EARLY BOOT VFP : SYSTEM ALERT *****

SYSTEM NAME: nbluegsp

DATE: 01/15/2002 TIME: 20:39:44

ALERT LEVEL: 6 = Boot possible, pending failure - action required

REASON FOR ALERT

SOURCE: 8 = I/O

SOURCE DETAIL: 3 = local bus adapter   SOURCE ID: FF

PROBLEM DETAIL: 6 = configuration error

LEDs:  RUN        ATTENTION       FAULT       REMOTE       POWER

       FLASH      OFF             OFF         ON           ON

LED State: Running non-OS code. (i.e. Boot or Diagnostics)

0x2000006683FF2164 000000FF FF01FF83 - type  4 = Physical Location

0x5800086683FF2164 00006600 0F14272C - type 11 = Timestamp 01/15/2002 20:39:44

A/a: ack read of this entry - Q/q: quit Virtual Front Panel Display
```

This indicates that the self-test proceeded to the I/O testing of the core SCSI/LAN card. Insert or replace the core SCSI/LAN card and retest. If this does not fix the problem, then replace the PCI I/O backplane card and retest.

5. At this point the system should boot successfully to BCH and BCH commands could be used to check out the system. It should then be possible to boot to IPL from the support CD-ROM and to use any available offline diagnostics or utilities to fully test the system. Alternatively, you can attempt to boot from the internal disk, external disk, or a support CD-ROM all the PCI I/O cards and the internal peripherals and boot to BCH successful. If you cannot get to BCH at this point, it would be best to concentrate on the VFP chassis codes and any alerts generated during the self-test and/or analyze the GSP error log contents to troubleshoot the system further.

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